



**Consolidated Program for Research and Development for Welding  
of High Strength Steel Pipelines, #277 & 278**

**PUBLIC PAGE**

**13<sup>th</sup> QUARTERLY REPORT**

**Project WP#277: Update of Weld Design, Testing, and Assessment  
Procedures for High Strength Pipelines**

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# **Consolidated Program for Research and Development for Welding of High Strength Steel Pipelines, #277 & 278**

## **Project WP#277: Update of Weld Design, Testing, and Assessment Procedures for High Strength Pipelines**

### **Background**

High strength pipelines are expected to become a major player in long distance onshore hydrocarbon transportation. Understanding the differences between the modern high strength and older-generation linepipes is critical to the safe and economical application of those modern materials. The objectives of this project to fill the critical gaps and provide guidelines on the effective use of high strength linepipes, from design and testing to weld integrity assessment procedures. The interdependence of linepipe materials, welding processes, design requirements, and weld integrity are being investigated to enable realistic and effective use of high strength linepipes.

### **Progress in the Quarter**

The teams from CRES, CANMET, LEC, and NIST completed the following activities in the twelfth quarter of this project:

1. Continued development of weld metal (WM) tensile and toughness testing protocols
2. Generated more all-weld metal (AWM) tensile data
3. Generated low-constraint single-edge tension (SE(T)) toughness data for heat affected zone (HAZ) and weld flaws
4. Completed more curved wide plate (CWP) tests
5. Conducted post-test analysis of CWP data, including calculation of unloading compliance
6. Developed compliance functions for CWP specimens
7. Computed flaw growth from unloading compliance and the compliance functions
8. Developed fixtures for fatigue pre-cracking of the third round of welds
9. Delivered materials to multiple laboratories for the round-robin tests of SE(T) specimens
10. Communicated the progress and results of the project with standards committees.

The researchers also prepared the draft recommended practice document outlining the methods and procedures to machine AWM strip tensile specimens and circulated it among all team members for review. The project team is also seeking feedback from commercial laboratories involved in assessment of AWM tensile properties of pipeline girth welds. The team has conducted a large number of fracture toughness tests, including fatigue-pre-cracked low-constraint single-edge tension SE(T) samples in order to evaluate the fracture resistance of the baseline single and dual torch X100 welds. The team continues to hold joint weekly web-conferences. The team presented the results of the consolidated program in six papers at the International Pipeline Conference (IPC) 2010.